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COPY FOR MR. J. ALLAN ROSS



HYDRO-ELECTRIC INQUIRY COMMISSION

ENGINEERING DATA

THE QUEENSTON-CHIPPAWA POWER DEVELOPMENT

CHAPTER "K"—COSTS

ANALYSIS OF ESTIMATES


PART I—TEXT

WALTER J. FRANCIS & COMPANY

CONSULTING ENGINEERS







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ANALYSIS OF ESTIMATES  
OF COSTS

Chapter K.

COSTS

(Analysis of Estimates)

Part I - Text

Walter J. Francis.



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Chapter K.COSTS

Walter J. Francis.

In accordance with your instructions I have studied the documents and records of the Hydro-Electric Power Commission regarding costs, all of which will be included in Chapter K in two parts, of which this is the first. In dealing with the matter of costs I have taken first, all estimated costs, and secondly, actual expenditures. The first part of Chapter K is called "Analysis of Estimates", being a compilation and summary of estimated costs and documents related thereto, and is itself divided into two sections,- the text and the appendices.

Analysis of Estimates.Estimates.

The records of the Hydro-Electric Power Commission in regard to estimates are voluminous. The word "estimates" has been used in two senses, one referring to estimated cost of works in contemplation or under construction, and the other to requests to the Government for appropriation of money required from year to year. The estimates of cost may be based on unit prices for future work, or they may be a combination of expenditures already made with the estimates of cost of future work added. As used in the second sense,



namely appropriation, the word refers to documents passing between the Hydro-Electric Power Commission and the Government, annually, semi-annually or at other intervals, as the case may be, to make known the estimated financial requirements of the Hydro-Electric Power Commission in advance, for all the work within the jurisdiction of the Hydro-Electric Power Commission during the stated period.

#### Estimated Costs.

The first estimate for the Queenston-Chippewa Power Development, being that known as No. 1, was for the purpose of indicating the feasibility of the general type of project then designed and studied. It was dated in June, 1915. The last estimate is dated January 29, 1923, and is a figure intended to indicate the total cost of the ultimate capacity of the project as now partly constructed, the whole being an evolution of the general type of project first reported upon. Between these two dates are many other estimates of cost, all relating in a general way to evolutionary stages of the general project and under the conditions existing from time to time. The earlier estimates relate entirely to work in contemplation, while the later ones have been based on expenditures already made,-- the later the estimate the greater the proportion of actual expenditure figures contained in it.

Practically all of the estimates above referred to have been made by the engineers of the Hydro-Electric Power Commission, or by consulting engineers and contractors engaged by them. Some of the figures in the form of letters have been sent out by the officers of the Hydro-Electric Power Commission.



Estimate No. 2, dated in November, 1917, referred to the work on which the actual construction was commenced.

The estimates, taken in the sense of the estimated cost of the Queenston-Chippawa Power Development as a project, are dealt with in a connected way by Mr. Gaby in a letter addressed to the writer under date of January 29th, 1923. A full text of this letter now follows, and to it has been added a certain number of notes by myself, in parentheses, for convenience of reference in using this and other documents.

"January 29, 1923.

"Mr. Walter J. Francis,  
Consulting Engineer,  
Hydro-Electric Inquiry Commission,  
T O R O N T O.

COPY

"Dear Sir: re Questions Nos. 1, 2 and 3 of the Inquiry Commission

"In answer to the request of Mr. R. A. Ross, Commissioner, that the Hydro-Electric Power Commission prepare a connected statement covering the estimates, reports and documents submitted to you under request of the Hydro-Electric Inquiry Commission, dated April 26th, 1921, I am submitting to you the following report, and history, discussing in general the estimates and reports that have been forwarded.

"The necessity of preparing for, or obtaining a supply of additional power to meet the future demands of the municipalities in the Niagara District were carefully considered during the years 1912 and 1913, and a general report on the subject was submitted to the Provincial Government by Sir Adam Beck, as a



result of which the Government made an appropriation of \$35,000.00 during its session of 1914, for the investigation of the possibilities of further development at Niagara.

"During the year 1914, studies and estimates were made on several schemes for the development of power at Niagara Falls, or in the Niagara Peninsula, including the Queenston-Chippawa Development and the Jordan-Lake Erie Development, etc., and estimates were submitted to the Commission during the summer of 1915, together with recommendations favoring the Queenston-Chippawa project as the most feasible development. These estimates (No. 1) have been submitted to you."

COPY  
(See Appendix No. 1 hereof. W.J.F.)

"The amount of power delivered to the municipalities in the summer of 1913 amounted to - 45,502 H.P.

in 1914 - 76,977 H.P.

in 1915 - 103,959 H.P.

"The report of September 13th, 1915, forwarded to the Premier of Ontario and Cabinet of Council, dealt with certain facts and recommendations relative to the power situation at Niagara Falls and the supply of power to the municipalities in Western Ontario, and requested authority to proceed with the development of power at what is now known as the Queenston-Chippawa Development.

"This projected scheme, estimated on in the years 1914 and 1915, provided for the development of 200,000 H.P., with a preliminary equipment installation of 100,000 H.P. capacity, at an estimated cost of \$10,410,000 and for a 200,000 H.P. equipment installation at an estimated cost of \$13,149,803.00."



(See Appendix No. II hereof. W.J.F.)

"The matter was given thorough consideration by the Government and at the next ensuing session of the Legislature an Act was passed respecting the public development of water powers in the vicinity of Niagara Falls, and entitled "The Ontario Niagara Development Act", which Act, provided for the development of power by the construction of works for the purpose of diverting water from the Niagara River, the Welland River and tributary waters, such works to be constructed and operated by the Hydro-Electric Power Commission.

"Upon receiving the authority of the Government and necessary Orders-in-Council, which were passed on June 15th and July 6th, 1916, the Commission issued instructions to the engineers to proceed with the necessary detailed engineering studies, and gave authority for the acquisition of right-of-way for the construction of the Quesnaton-Chippawa Development.

"Engineering studies and investigations were proceeded with, and in December of 1916 tenders were invited for the construction of the power canal.

"During January, 1917, tenders were received from four corporations, one failing to submit a proposition. No tender was received for a lump sum proposition, all being made on a basis in general of cost of the work, plus a percentage, with variations for rental of equipment.

"These tenders were carefully considered and reports submitted to the Commission on January 11th, 1917, copies of which you have on hand, along with the tenders received.

"The following Companies submitted propositions, viz:-

- (1) The Dominion Construction Company.
- (2) The Dominion Dredging Company, Ottawa.



(3) William Cowlin & Co., Toronto.

(4) Baldry, Yerbaugh & Hutchinson.

(5) The Foundation Company, Ltd., Montreal.

and a communication from Larkin & Sangster."

(See Chapter G, Contract Work and Other Methods of Construction Procedure. W.J.F.)

JAN.  
1917  
"After investigation and an analysis of the propositions submitted, it was recommended that the work be undertaken by the Commission, in view of the necessity of speed, and the use of larger equipment than that in the possession of the various parties tendering.

"By reason of the continued growth of the demands for power the Commission in 1916 was obliged to enter into an agreement for an additional 50,000 H.P. with the Canadian Niagara Power Company, which additional amount of power was all absorbed by the Niagara municipalities by the Spring of 1917. In order to further augment the available supply, negotiations were entered into and completed by the Commission for the purchase of the plant of the Ontario Power Company.

"In the meantime, upon the vote of the municipalities in the Niagara District, legislation had been enacted, placing the control of the Queenston-Chippawa Development under the Hydro-Electric Power Commission for and on behalf of the municipalities in the Niagara District, under an Act known as "The Ontario Niagara Development Act of 1917".

"During January, 1917, the Commission gave full consideration to the tenders received for the construction of the Canal and works, and decided to



proceed with the work with its own staff on a day labour basis.

"A report was received by the Commission from its Consulting Engineer, Mr. R. D. Johnson, on February 1st, 1917, dealing with the economics of the design of the power canal for 6550 second feet, or a capacity of approximately 200,000 H.P., and in view of the fact that the demand for power in the Niagara District continued to grow at an increasing rate, and owing to the fact that the Commission, through the purchase of the Ontario Power Company, had obtained its water rights, it was considered advisable to reconsider the scheme of development in the light of these new and constantly changing conditions. Instructions were therefore given for the preparation of a further report on a larger development. The investigation of the engineers of the Commission and its consulting engineers is incorporated in an extensive general report, prepared under date of November 27th, 1917, and subsequently submitted to the Commission during the Spring of 1918, recommending the construction of a 300,000 H.P. development, involving the ultimate use of 10,000 second feet in place of the 6,550 originally estimated upon.

"This general report considered the schedule of operations, construction methods, organization, the reports of consulting engineers, and critical discussions of same.

"In addition to detailed estimates covering the open waterway scheme, as finally adopted, this report also contained estimates of the cost of a pressure tunnel scheme and a scheme for a combined pressure tunnel and open waterway.

"This report has for some time past been in your hands and contains the following estimates:



300,000 H.P.	-	\$24,316,815.
200,000 H.P.	-	\$21,025,559.
150,000 H.P.	-	\$18,985,997.

(See Appendices III, IV and V hereof. W.J.F.)

"In addition to the estimates originally included in the report there has also been forwarded an estimate for the open waterway scheme, using as a basis the unit prices for earth and rock mentioned in the reports of experienced engineers, copies of which are incorporated in the general report, this estimate for an open canal of 300,000 H.P. capacity amounting to \$29,121,773."

(See Appendix VI hereof. W.J.F.)

"In the matter of the **COPY** estimates submitted, unit prices upon which they were based were obtained from the reports of experienced consulting engineers and contractors, or were derived independently by the Commission's engineers, as set forth in detail in the report in question."

(See Appendices VII to XII hereof, inclusive. W.J.F.)

"It is to be noted in connection with these estimates that the \$973,000 included for the intake works was for a breastwall intake of the conventional type, and not for the special type subsequently developed and constructed."

✓ "On the basis of this general report and the estimates and recommendations contained therein, the Commission authorized the proceeding with the work on the enlarged scale for a capacity of 300,000 H.P."

"Actual construction work, of a more or less preparatory nature, commenced in May, 1917, on the power canal, in accordance with the general scheme of design arrived at by the Commission's engineers and its consulting engineer."



Specifications were prepared, tenders invited and contracts awarded for equipment as per the report already submitted to you, and in connection with which I understand you have reported to the Inquiry Commission in detail.

"In order to carry on the work requisitions for appropriations were submitted to the Government in 1917, 1918, 1919, etc., as required, and there has already been submitted to you a list of the appropriations requisitioned for the fiscal years 1917-1918, 1918-1919, 1919-1920, 1920-1921, 1921-1922."

(See pages K-30 to K-50. W.J.F.)

"On January 12th, 1917, in answer to specific questions of the Government as to the estimated cost of the work and the amount to be expended each year, a communication was forwarded to the Prime Minister, Sir William Hearst, stating that the estimated cost of the work for 100,000 H.P. installed was \$10,410,000, and for 200,000 H.P. installed \$13,215,000, and advising that recent advances in the cost of hydro-electric machinery indicated that it might be necessary to increase these estimates by 15% up to a possible extreme maximum of 20%."

(See page K-35. W.J.F.)

"A memorandum was also forwarded to the Premier, Sir William Hearst, on February 5th, 1918, in which he was informed that the present plans and specifications for a power canal of 300,000 H.P. indicated an expenditure of from \$17,000,000 to \$24,000,000, and a further letter was forwarded on February 25th, 1919, to the Honourable Mr. McGarry, in which the Secretary advised that the cost of the completion of the work was estimated at \$24,000,000 to \$25,000,000, the horse-power to be developed at that cost being estimated at



300,000. These latter estimates of February 5th, 1918 and February 25th, 1919, were based on the general report, as above referred to."

(See page K-36. W.J.F.)

"In 1917 the demands of the municipalities had amounted to 163,056 H.P., and by 1918 to 167,725 H.P., the smaller increase between the two years being due to the fact that there was no available capacity to serve the demands of the municipalities, and a very severe shortage maintained in the municipalities in the Niagara System. Due to the enormous demand for war munitions during 1918 the Commission was forced, as a partial measure of relief, to add a 40,000 H.P. extension to the Ontario Power Company's plant, so as to meet, as far as was immediately possible, a very serious existing situation in the matter of meeting the demands of the municipalities for more power.

"These increasing power demands on the part of the Niagara municipalities became so urgent, even after the Armistice, that it was considered necessary, having regard to the then existing stage of construction, to devise some means of further increasing the capacity of the canal. Accordingly in March, 1919, a report and estimates were submitted to the Commission, setting forth a proposal designed to increase the estimated capacity of the canal from a 300,000 H.P. canal to one of 450,000 to 500,000 H.P.

"This report was dated February 14th, 1919, and with estimate No. 2-A, is already in your hands."

(See Appendix XIII hereof. W.J.F.)

"During the year 1918-1919, and subsequent to the submission of the last report and estimate, field experiments were carried on for the determination



of the best type of intake to be used for ice diversion at Chippawa. These experiments and tests were carried on at Niagara Falls on actual models of a scale of 1-20 to determine the best type of intake.

"Reports were prepared and submitted on these experiments as made at Dufferin Islands, covering the first season of 1918 and the second season of 1919, with photographs of the models used and the various data obtained from such experiments. The consulting engineers and the engineers of the Commission subsequently submitted recommendations, based on these experiments, for the construction of an intake designed to give the best results as regards ice diversion.

"Copies of the above **COPY** photographs and reports, together with the subsequent reports of the consulting engineers, Mr. R. D. Johnson and Mr. Benjamin F. Groat, covering canal bends, ice-skimmer, ice losses and design of intake for 15,000 to 20,000 second feet were previously submitted.

"The reports of the engineers were submitted to the Commission and it was decided to adopt the recommended intake design. This decision involved an increased estimated expenditure of \$1,922,720.00 over that provided for in the estimates Nos. 2 and 2-A of 1917 and 1919.

✓ "In the year 1920 the Government requested a report from the Hydro-Electric Power Commission upon the estimated cost of the Queenston-Chippawa Development and its probable date of completion, in answer to which request the Commission employed consulting engineers, - the Government concurring in this action - to prepare a report on the cost of the Queenston-Chippawa Development. Accordingly, Mr. Hugh L. Cooper and Mr. R. D. Johnson were appointed to prepare reports on



various parts of the work, Mr. H. L. Kerbaugh and Mr. R. S. Lea also prepared reports during the summer of 1920.

"These reports were submitted to the Hon. Mr. Drury in the Fall of 1920, as follows:-

Hugh L. Cooper,	August 7th, 1920.
Hugh L. Cooper,	October 22nd, 1920.
Stewart & Kerbaugh,	September 30th, 1920.
R. S. Lea,	October 25th, 1920.
R. D. Johnson,	June 1st, 1920,

and

together with correspondence between Sir Adam Beck and Premier Drury, are already in your hands."

(See Appendices XIV, XV hereof, and Chapter C. W.J.F.)

**COPY**

"A complete report was submitted to Mr. Drury on February 10th, 1922, which covered estimates for completion of the first five units as per the following tabulation:-

Expenditure to October 31st, 1921, including \$4,591,132.46 of interest,	- \$57,562,742.03
Estimated expenditure to May, 1923, to complete the five units by January, 1923, including \$8,000,000.00 estimated for the current fiscal year as above stated,	- <u>9,302,861.00</u>
Total to complete, with interest to October 31st, 1921,	- \$66,865,603.03
Further estimated amount of Interest to complete, chargeable to Capital Cost,	- <u>2,000,000.00</u>
Total Capital Investment to complete, including Interest,	- \$68,865,603.03
Less estimated salvage value of Construction Plant, Buildings and Stores costing \$16,977,600.58, to be recovered during the period now in question,	- <u>3,500,000.00</u>
TOTAL .....	✓ <u><u>\$65,365,603.03</u></u> ✓



"The estimates referred to above cover the completion of the five units with a capacity of the rock section of the canal of from 500,000 to 600,000 H.P., and installed capacity of 275,000 to 300,000 H.P.

"The above explanation, together with the material already submitted to you, would appear to constitute a complete answer to Question No. 1, and also to the first two sections of Question No. 2.

"In answer to Section C of Question No. 2, I am submitting herewith a memorandum covering same.

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"During the entire period of construction from 1917 to 1921 the rates of pay and costs of material had been rapidly rising, so that by the end of 1921 there had been an average increase over 1916 of 134 per cent in labour prices, and of 100 to 300 per cent in material prices, and over 66% of the excavation and 75% of concrete work was done during the years 1920-1921, which was the period of highest peak prices.

"In comparing the estimates prepared at various times it is necessary to take into consideration the above referred to increases in prices of labour and material, and under Question No. 2-(d) I have submitted to you an estimate of the cost of constructing the Queenston-Chippawa Development as it now stands, with five units installed, the new type of intake, the enlarged concrete lined canal, and other minor changes made since estimate No. 2 was compiled, and with unit prices adjusted to the 1916 prices of labour and material. This estimate gives a total cost of \$31,270,628.00, which is one that should be compared with the original estimates of 1917 and 1919, taking into account the increased



capacity of the canal, the improved type of ice diverter, and other items that are at variance with the estimates of the above mentioned dates."

(See Appendix XVI hereof. W.J.F.)

"At the same time I submitted another estimate differing from the above in that while the same adjusted unit prices are used as of 1916, they are applied to the original 1917 scheme, with permanent works for 300,000 H.P., five units installed, old type intake, and 10,000 second feet waterway.

"In this estimate the total cost is given as \$26,015,998.00, and is comparable with the original estimate for 300,000 H.P. as submitted in November, 1917."

(See Appendix XVII hereof. W.J.F.)

"In connection with Question No. 3, - I have already submitted to you the material called for under sub-headings (aa) and (ac), i.e., Folder containing "Summary of Expenditures, Accrued Liabilities, Commitments on Contracts and Contingent Liabilities as at March 31st, 1922" and a memorandum re Commencement and Operation of First Five Units, dated May 15th, 1922."

(See Appendix XXI hereof. W.J.F.)

"The Commission has also submitted to you an estimate covering answer to Question 3, sub-heading (ab), giving the estimated cost of completion of Canal, and general works and power houses, and equipment for the five units not included in (aa) from April 1st, 1922, in addition to which must be added the accumulated interest not chargeable to Operation, amounting to \$1,704,815.08, as shown in answer to Question 3, (ag)."



(See Appendix XVIII hereof. Appendices XIX are estimates for nine and ten units respectively. W.J.F.)

"We have also submitted a tabulation covering the answer to Question 3 (ac) being the estimated financial and overhead charges to be added to figures given in answer to Question 3 (ab) to cover interest, discount, management, etc. from April 1st, 1922."

(See Appendix XXI hereof. W.J.F.)

"In answer to Question 3 (ad); we would refer you to the Provincial Government for information as to the bonded indebtedness contracted by the Government for the Queenston-Chippewa Development on the basis of sales of securities at various times.

"The estimated amount to be contracted for through future sales at market prices to complete five unit equipment can only be referred to by us as the amount necessary to provide the sums required for expenditures under Question 3 (ab) and 3 (ac).

"The answer to Question 3 (af) is enclosed herewith, being a tabulation showing the dates on which the Commission have contracted for the installation of units 6, 7 and 8, and estimates of the probable dates of the installation of units 9 and 10.

"The answer to Question 3 (ag) is shown on the tabulation submitted under heading "Hydraulic Estimates 3 (ag)", Electrical Equipment 3 (ag), and an Analysis of the Interest charges re Question 3 (ag) and (ah), and No. 7; also



a compilation of probable charges on account of plant and stores providing same are not disposed of before the completion of the 10th unit, showing the residual value of same.

"As to Question No. 4, - this I believe has been answered in full and the information forwarded to you some time ago.

"In the matter of Question No. 5, practically all of the data has been submitted to you and I question if any additional information by way of completing the answer to this question can be furnished by correspondence, it being deemed more satisfactory to carry on the necessary research by conference directly with the staff who were engaged in the field on the work at Niagara.

"This gives you a complete answer to all questions up to Nos. 6 and 7: the answers to which are under preparation at the present time and are expected to be ready for submission to you by the end of the week.

Yours very truly,

(signed) F. A. Gaby,

Chief Engineer."

Summary List of Estimates of Cost.

For the sake of convenience of comparison and reference, the various estimates on record, and referred to by Mr. Gaby, have been compiled into the following table in chronological order, together with a brief reference to the salient features thereof in order. Following the summary is a series of notes explaining the bases used in the computations.





WALTER J. FRANCIS & COMPANY.

COPY FOR ENCLOSURE TO Mr. J. Allan Ross.

ANALYTICAL LIST OF ESTIMATES OF COST OF

Date of Estimate	Nominal Installation Horse-power	Canal Capacity Approximately Cu.ft. per Sec.	Horse-power	Total Amount of Estimate in Dollars	Approx. Capital Cost per H.P.	Basis of Estimate
No. 1, June 23, 1915	100,000	6,550	varying	10,410,253	104*	A ....
January 5, 1916	200,000	6,550	varying	13,149,003	65	B ....
January 12, 1917	100,000	6,550	varying	12,490,000	125*	C ....
No. 2, November 27, 1917	300,000	10,000	500,000	24,316,815	81	D ....
"	200,000	10,000	300,000	21,025,569	105*	E ....
"	150,000	10,000	300,000	18,985,997	126*	F ....
"	300,000	10,000	300,000	29,121,773	97	G ....
"	300,000	10,000	300,000	31,005,814	103	H ....
"	200,000	10,000	300,000	27,977,280	140*	I ....
"	150,000	10,000	300,000	26,297,387	175*	J ....
"	300,000	10,000	300,000	25,538,685	85	K ....
"	200,000	10,000	300,000	22,560,061	113*	L ....
"	150,000	10,000	300,000	20,895,686	140*	M ....
February 5, 1918	300,000	10,000	300,000	24,100,000	80	N ....
No. 2-A January 3, 1919	300,000	15,000	500,000	25,102,915	54*	O ....
February 25, 1919	300,000	15,000	500,000	25,000,000	50	P ....
Late in 1919	300,000	15,000	500,000	27,025,635	90*	....
August 7, 1920	250,000	15,000	500,000	66,423,416	257*	R ....
"	300,000	15,000	500,000	76,636,931	197*	S ....

WASHINGTON-D.C. OFFICE OF THE DISTRICT ENGINEER.

Type of Project	Reference Page or Appendix	Remarks
... Canal	I	Preliminary. See details.
... Canal	II	Based on Estimate No. 1. See details.
... Canal	Page K-9	Letter to Sir William Hearst saying estimate would be increased 15% or possibly 20%.
... Canal	III	For complete 300,000 horse-power installation.
... Canal	IV	Based on Estimate No. 2. See details.
... Canal	V	Based on Estimate No. 2. See details.
... Canal	VI	Based on Estimate No. 2. using Douglass unit excavation prices.
... Tunnel	VII	Based on Estimate No. 2. See details.
... Tunnel	VIII	Based on Estimate No. 2. See details.
... Tunnel	IX	Based on Estimate No. 2. See details.
... Tunnel and Canal	X	Based on Estimate No. 2. See details.
... Tunnel and Canal	XI	Based on Estimate No. 2. See details.
... Tunnel and Canal	XII	Based on Estimate No. 2. See details.
... Canal	Page K-9	Letter to Sir William Hearst saying expenditure will be from \$17,000,000 to \$24,000,000.
... Canal	XIII	Based on Estimate No. 2. See details.
... Canal	Page K-9	Letter to the Honourable F. W. McGarry saying expenditure will be from \$24,000,000 to \$25,000,000.
... Canal	Page K-10	Present Intake added. See details.
... Canal	XIV	Cooper Estimate, H.M.F.C. design.
... Canal	XIV	Cooper Estimate, H.M.F.C. design.

Accounting

Account	Debit	Credit	Balance
1000 Cash			
1010 Accounts Receivable			
1020 Inventory			
1030 Prepaid Insurance			
1040 Equipment			
1050 Accumulated Depreciation			
2000 Accounts Payable			
2010 Wages Payable			
2020 Interest Payable			
2030 Income Tax Payable			
2040 Dividends Payable			
3000 Sales			
3010 Sales Tax Payable			
3020 Cost of Sales			
4000 Retained Earnings			
4010 Dividends			
5000 Revenue			
5010 Cost of Revenue			
6000 Expenses			
6010 Salaries Expense			
6020 Rent Expense			
6030 Utilities Expense			
6040 Insurance Expense			
6050 Depreciation Expense			
6060 Interest Expense			
6070 Income Tax Expense			
6080 Dividend Expense			
6090 Other Expenses			

COPY

WALTER J. FRANCIS & COMPANY.

COPY FOR ENCLOSURE TO Mr. J. Allan Ross.

SUMMARY LIST OF ESTIMATES OF COST OF

Date of Estimate	Nominal Installation Horse-power	General Capacity Approximately Cu.Ft. Horse-power per Sec.	Total amount of Estimate in Dollars	Approx. Capital Cost per H.P. Estimate	Basis of Estimate
No.2-1 August 7,1920	250,000	15,000 500,000	60,832,992	243*	T .....
"	300,000	15,000 500,000	72,215,755	186*	U .....
"	311,000	20,000 500,000	71,988,626	231*	V .....
"	349,000	20,000 549,000	60,950,506	162	W .....
September 30,1920	250,000	15,000 500,000	43,271,759	173*	X .....
"	450,000	15,000 500,000	52,271,759	116*	Y .....
"	250,000	22,000 660,000	46,971,759	186*	Z .....
"	450,000	22,000 660,000	56,971,759	124*	AA .....
"	660,000	22,000 660,000	67,871,759	103	BB .....
December 13,1921	300,000	15,000 500,000	54,275,593	181*	CC .....
February 10,1922	300,000	15,000 500,000	45,265,603	318*	DD .....
January 27,1923	300,000	15,000 500,000	31,270,623	134*	EE .....
"	300,000	10,000 300,000	26,015,998	87	FF .....
January 23,1923	500,000	15,000 500,000	64,370,189	214*	GG .....
"	500,000	15,000 500,000	74,677,367	149	HH .....
"	550,000	18,000 550,000	80,729,014	147	II .....

Note: The figures in the column headed "Approximate Capital Cost per Horse-power" are arrived at by dividing the "Total Amount of Estimate in Dollars" by the "Nominal Installation Horse-power". In cases where the installation is only part of the capacity of the development as a whole the figures in the column headed "Approximate Capital Cost per Horse-power" are marked with a star, thus \*, and are not comparable amongst themselves nor with those not so designated with a star. It will thus be seen that there are eleven cases on a corresponding basis.

UNIT PRICE-SHEET, A. POWER BY TABLE (continued).

Type of Project	Reference Page or Appendix	Remarks
.... Canal	XIV	Cooper Estimate, Cooper modified design.
.... Canal	XIV	Cooper Estimate, Cooper modified design.
.... Canal	XIV	Cooper Estimate, Cooper modified design.
.... Canal	XIV	Cooper Estimate, Cooper modified design.
.... Canal	XV	Stuart and Kerbaugh Estimate. Combination of Expenditures and Estimates.
.... Canal	XV	Stuart and Kerbaugh Estimate. Combination of Expenditures and Estimates.
.... Canal	XV	Stuart and Kerbaugh Estimate. Combination of Expenditures and Estimates.
.... Canal	XV	Stuart and Kerbaugh Estimate. Combination of Expenditures and Estimates.
.... Canal	XV	Stuart and Kerbaugh Estimate. Combination of Expenditures and Estimates.
.... Canal	XV	Stuart and Kerbaugh Estimate by additions to former Estimate.
.... Canal	Page K-12	Submitted to the Honourable H. C. Drury. See details.
.... Canal	XVI	Project as built, using 1916 unit prices. See details.
.... Canal	XVII	Project as designed in 1917, using 1916 unit prices. See details.
.... Canal	XVIII	Five units complete. Combination of Expenditures and Estimates.
.... Canal	XIX	Nine units complete. Combination of Expenditures and Estimates.
.... Canal	XX	Ten units complete. Combination of Expenditures and Estimates.



Bases of the Various Estimates.

The column headed "Basis of Estimate" contains a series of reference letters, one for each item.

The details of Basis A will be found following the detail figures of Estimate No. 1 in Appendix I. Generally the figures refer to an installation of 100,000 horse-power in hydraulic and electrical machinery, with provision for an ultimate development of 300,000 horse-power for the whole project, with certain minor exceptions. There was protection against ice only at Chippawa; no dredging in the Welland River; dredging between Montrose and the entrance of the rock canal sufficient for the 100,000 horse-power installation; permanent control works at the entrance of the rock canal; rock canal with a capacity for 300,000 horse-power installation; right-of-way for 300,000 horse-power installation; no regulating flume excavation; no artificial storage; highway and railway bridge construction for 300,000 horse-power installation; substructure and superstructure of screen house for 300,000 horse-power installation; cranes in screen house for 600,000 horse-power installation; service ducts for 600,000 horse-power installation; penstock or shaft provision for 100,000 horse-power installation; excavation only for penstocks for 300,000 horse-power installation; ice-shaft for 600,000 horse-power installation, substructure of power house and tailrace for 300,000 horse-power installation; excitation complete for 600,000 horse-power installation; superstructure of power house for 100,000 horse-power installation; electrical equipment for 100,000 horse-power installation, including cranes for 600,000 horse-power;



and switching equipment for 12,000-volt apparatus in the power house.

Basis B is similar in all respects to Basis A excepting that the hydraulic and electrical installation, together with its essential accessories, was for 200,000 horse-power instead of 100,000 horse-power installation. It involved also dredging in the Welland River to the amount of \$224,000 and in the earth section of the Canal to the amount of \$120,250. The unit prices were the same as for Basis A.

Basis C is the same as Basis A.

Basis D is for the project with an installation of 300,000 horse-power in hydraulic and electrical equipment. It involved a canal capacity throughout of 300,000 horse-power. In general plan and layout Basis C corresponds with Basis A and Basis B, with the modifications that the engineers of the Hydro-Electric Power Commission added as a result of their studies during the interval between Estimate No. 1 in 1915 and Estimate No. 2 in 1917. The unit prices used for earth excavation in the estimate is 27 cents per cubic yard and for rock excavation 98 cents per cubic yard.

Basis E is comparable in all respects with Basis D excepting that the hydraulic and electrical installation and essential accessories is for 200,000 horse-power instead of 300,000 horse-power, using the same unit prices.

Basis F is comparable in all respects with Basis D excepting that the hydraulic and electrical installation and essential accessories is for 150,000



horse-power instead of 300,000 horse-power, using the same unit prices.

Basis G is identical with Basis D, but the unit prices suggested by Mr. A. C. Douglass have been used in the computation.

Basis H is the same as Basis D in the matter of installation and capacity but it was a tunnel project to which reference has already been made in Chapter "C" under the heading of Advisory Reports.

Basis I is similar to Basis H, excepting that the hydraulic and electrical installation is for 200,000 horse-power instead of 300,000 horse-power.

Basis J is similar to Basis H, excepting that the hydraulic and electrical installation is for 150,000 horse-power instead of 300,000 horse-power.

Basis K is the same as Basis D in the matter of installation and capacity, but it was for a combined tunnel and canal project to which reference has already been made in Chapter "C" under the heading of Advisory Reports.

Basis L is the same as Basis K excepting that the hydraulic and electrical installation is for 200,000 horse-power instead of 300,000 horse-power.

Basis M is similar to Basis K excepting that the hydraulic and electrical installation is for 150,000 horse-power instead of 300,000 horse-power.

Basis N is the same as Basis D.

Basis O is the same as Basis D, with the important exception that the



canal capacity was increased from the approximate capacity of 10,000 cubic feet per second to an approximate capacity of 12,000 cubic feet per second by lowering the grade line of the bottom of the rock section, and by lining the bottom and sides of the rock section of the canal with concrete. The main hydraulic and electrical installation remained as before at 300,000 horse-power.

Basis P is the same as Basis O, - namely, with a nominal installation of 300,000 horse-power and an approximate canal capacity of 15,000 cubic feet per second.

Basis Q is the same as Basis O with the addition of the intake as now constructed instead of the originally contemplated protection against ice only.

Basis R is an estimate made by Hugh L. Cooper & Company in August, 1920, of the probable cost of the completed project for 300,000 horse-power with five units, based on the unit prices set forth in Appendix XIV hereof.

Basis S corresponds to Basis R excepting that the hydraulic and electrical installation is for 500,000 horse-power, nine units, instead of 300,000 horse-power.

Basis T is comparable with Basis R excepting that Hugh L. Cooper & Company have used a design modified by themselves and have applied their own unit prices.



Basis U is similar to Basis T excepting that the hydraulic and electrical installation is 500,000 horse-power instead of 300,000 horse-power.

Basis V corresponds with Basis T with a 300,000 horse-power hydraulic and electrical installation, but with the canal capacity increased to 20,000 cubic feet per second.

Basis W corresponds with Basis V with the exception that the hydraulic and electrical installation is for 500,000 horse-power instead of 300,000 horse-power.

Basis X corresponds with Basis G, being for 300,000 horse-power hydraulic and electrical installation and 15,000 cubic feet per second canal capacity, using the record of expenditures up to the date in the estimate in the total.

Basis Y corresponds to Basis X excepting that the hydraulic and electrical installation is for 500,000 horse-power instead of 300,000 horse-power.

Basis Z corresponds with Basis Y excepting that the hydraulic and electrical installation is for 250,000 horse-power instead of 500,000 horse-power, and a further exception that the canal capacity is increased from 15,000 cubic feet per second to 22,000 cubic feet per second.

Basis AA is the same as Basis Z excepting that the hydraulic and electrical installation is for 450,000 horse-power instead of 250,000 horse-power.

Basis BB is the same as Basis Z excepting that the hydraulic and electrical



installation is for 660,000 horse-power instead of 250,000 horse-power.

Basis CC is the same as Basis X, the expenditures up to 1921 being used instead of the estimated costs as in Basis X.

Basis DD is for the project as built with five units complete.

Basis EE is for the project as built with five units complete, using the unit prices which were used in Basis D.

Basis FF is for the project as designed in 1917, being Basis D with the same unit prices as in Basis EE.

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Basis GG is for the project as built with five units complete, using expenditure figures to date and estimates for the future.

Basis HH is the same as Basis GG excepting that it is for the project with nine units complete, using expenditure figures to date and estimates for the future.

Basis II is the same as Basis GG excepting that it is for the project with ten units complete, using expenditure figures to date and estimates for the future.

Form of Estimates.

Estimate No. 1.

Estimate No. 1 is a document consisting of a communication from the

copy

Hydraulic Engineer, Mr. Acres, to the Chief Engineer, Mr. Gaby. The communication is a two-page type-written memorandum entitled "Basis of Estimate for Proposed Installation of 100,000 Horse-power with Provision for an Ultimate Development of 300,000 Horse-power Installation", followed by five type-written pages of details segregated according to the elements of the development, and in which the quantities, unit prices, capital cost, maintenance and depreciation figures, and annual cost are given, all as set forth in Appendix No. 1.

There is also attached to the estimate a letter of transmittal from Mr. Gaby to Sir Adam Beck, Chairman of the Hydro-Electric Power Commission, reading as follows:

COPY

"Toronto, June 23rd, 1913

"To Sir Adam Beck, Chairman:

Sir:

In compliance with the instructions of the Commission I have carefully investigated the power conditions on the Niagara Peninsula and am pleased to submit a preliminary estimate covering the development of 100,000 H.P. at the Queenston site.

The following are the assumptions which have been used in preparing the estimates, which provide for an ultimate development of 300,000 H.P. at the site, viz:

1. Protection against ice only at Chippawa, the lower channel between Hog Island and shore providing water when permanent work is placed for extension;
2. No dredging in Welland River. Present section assumed sufficient;
3. Dredge for 100,000 H.P. installation from Montrose to mouth of rock canal for 300,000 H.P.;
4. Permanent control works at mouth of rock canal for 300,000 H.P.;
5. Rock canal for 300,000 H.P. installed;



6. Purchase full right-of-way for 300,000 H.P.;
7. No regulating flume excavation;
8. No artificial storage;
9. Highway and railway bridges built for extension at time flume is added, i.e. for 300,000 H.P.;
10. Forebay excavation for 300,000 H.P.;
11. Sufficient excavation made in storage to provide safe location of concrete wall separating storage from canal;
12. Retaining wall along International Railway where needed;
13. Substructure for 300,000 H.P. installed at head house;
14. Superstructure for 300,000 H.P. installed at head house;
15. Cranes for all possible future purposes, i.e. 600,000 H.P. at head house;
16. Service tunnel, hot air, elevator and duct lines for 600,000 H.P.;
17. One complete lined shaft and tunnel for 100,000 H.P.;
18. Two shafts and tunnels excavated only for 300,000 H.P.;
19. Ice shaft for 600,000 H.P.;
20. Substructure and tail-race for 300,000 H.P.;
21. Exciter penstock and shaft for 600,000 H.P.;
22. Superstructure for 100,000 H.P., power house;
23. Electrical equipment for 100,000 H.P. including cranes for 600,000 H.P.;
24. Switching equipment for 12,000-volt apparatus in power house.

We have estimated that the completion of the above works will cost \$10,500,000.00, or an estimated cost per H.P. of \$105.00, for 100,000 H.P. The estimated annual charge on the above expenditure amounts to \$944,600.00, or \$9.44 per H.P. This capital expenditure includes, in addition to that required for 100,000 H.P. development, the necessary equipment in the power house and head-works for an extension to 300,000

4903

H.P.

The approximate cost for 200,000 H.P. will be in the neighborhood of \$70.00 per H.P. with an annual charge of less than \$8.00.

This development is a feasible one and will give the Commission a large amount of power at minimum cost and maximum efficiency, it being possible to realize a head of 305 feet at this point, which is practically double the heads available at the present sites at Niagara.

In addition to the advantage of the high head mentioned, it is possible to secure property for storage purposes, which will enable the Commission to draw continuously the uniform amount of water from the Welland River. The surplus waters available are sufficient to generate 250,000 H.P.

Yours truly,

(signed) F. A. Gaby,

Chief Engineer."

Included with the papers transmitted to me by the Hydro-Electric Power

Commission is a memorandum reading as follows:

"Estimate No. 1.

"This estimate, prepared in June, 1918, was based more or less on reconnaissance data, as the surveys were still in progress. No plans accompany this estimate except the tentative typical sections of the canal prism estimated upon. Apart from these cross-sections the figures for the structures involved were developed from note-book sketches.

Earth and rock quantities in the canal were estimated on the basis of a tentative alignment fixed with reference to surveys completed at that time.

The intake consisted of a timber boom only, as the diversion required for 100,000 H.P. was not considered great enough to induce ice trouble.

No estimate was made for the cost of any capacity in excess of 100,000 H.P. at this time, the main purpose being to indicate the possibility of producing power at a reasonable cost in quantities within the absorptive capacity of the market prospects then in sight on the Niagara System.

This estimate was prepared as a justification for extending the surveys and obtaining all data necessary for detailed plans, studies and estimates."



Estimate No. 2.

Estimate No. 2 consists of a comprehensive general report on paper of ordinary business size and is two and one-half inches thick. The memorandum transmitting it to me reads as follows:

"Estimate No. 2.

"The attached report includes the basic data as to organization, plant layout, construction methods and estimates for the scheme as finally approved. The estimates contained in this report were the only complete series of estimates made previous to the commencement of construction, and subsequent changes in the design and methods of procedure were not sufficiently radical to require more than the adjustment of certain sections of these general estimates.

Details of the general estimates contained in this report are attached as an appendix to the report."

A description of the project consists of twenty-six type-written pages signed by Mr. Acres, and dated Toronto, December 26th, 1917, and deals with the governing conditions, the boundary waters treaty, contractual limitations, maximum head, adaptability for extension, maximum degree of advantageous use of water, capital costs, scheme of development, canal design, construction methods, programme of operations, capital cost, alternative schemes of development, general considerations, head water levels and gross head, comparative head losses, comparative carrying capacity, ice conditions, comparative capital cost, general conclusions; and is transcribed in full following the figures of the Estimate in Appendix III hereof.

After the text above referred to, there are fourteen appendices, five sets of plates, in addition to about one hundred and twenty pages of matter referring to electrical equipment and buildings therefor.



Accounting Department Record of Expenditures.

Appendix XXI hereof consists of a transcription of the record of the Accounting Department of the Hydro-Electric Power Commission in connection with the Queenston-Chippawa Power Development, giving the summary of expenditures, accrued liabilities, commitments on contracts and contingent liabilities as at March 31st, 1922.

This record of expenditures will be used also in the second part of this Chapter under the heading "Analysis of Expenditures".

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Estimates Submitted by the Commission to the Government.

In reply to the latter part of question No. 1 of the Questionnaire, referring to Estimates passing periodically from the Hydro-Electric Power Commission to the Government, Mr. Gaby has handed me a file under the general title of "Expenditures for the Years 1916 to 1922 inclusive". Mr. Gaby states that this file contains a complete transcription of all the papers in his department referring to requests for appropriations, and that he has no further information of any kind in reference thereto. I have studied the matter and have spent much time thereon with Mr. Gaby, and with Mr. Pierdon the Chief Accountant of the Hydro-Electric Power Commission.

The papers in the files refer to expenditures for the general work and operations of the Hydro-Electric Power Commission, and in the details include a reference to the Queenston-Chippawa Power Development in almost every case. I have therefore compiled all these references in chronological order, and have compared them with the "Advances by Provincial Government", and "Expenditures" as given by Messrs. Price, Waterhouse & Co. on page 5 of their Report dated August 2nd, 1922, entitled "Memorandum re Analysis of Capital Assets of the Hydro-Electric Power Commission and of Controlled and Operated Companies and Systems". The table refers to the Queenston-Chippawa Development only. In the table the year is taken as ending at the fiscal year, and the column headed "Requests for Appropriations" refers to requests by the Hydro-Electric Power Commission in the sense of "Estimates submitted by the Commission to the Government". "Advances" are sums made by the Government out of Appropriations.



## Finance Memorandum

Year Ending October 31	Requests for Appropriations	Appropriations made by Government	Advances on Appropriations	Expenditures by H.E.P.C.
1916	\$ 500,000	\$ 500,000	\$ 200,000	\$ 33,512
1917	1,000,000	1,000,000	1,000,000	2,343,276
1918	4,175,000	4,175,000	3,875,000	5,174,181
1919	6,000,000	6,000,000	6,000,000	7,162,999
1920	14,500,000	14,500,000	11,285,000	12,132,926
1921	30,680,674	30,680,674	30,680,674	31,171,470
1922	9,070,000	9,070,000	8,237,871	7,844,511
Total	\$65,925,674	\$65,925,674	\$61,278,545	\$65,862,878

In explanation of the above figures Mr. Gaby wrote me under date of February 12th, 1923, as follows:

"In response to your request I submit below a statement prepared by the Accountant of the Commission, which shows the Appropriations by the Legislature, Advances to the Commission therefrom and Expenditures each year 1916 to 1922 inclusive in respect to the Queenston-Chippawa Development works.

Year	Appropriations	Advances	Expenditures
1916	500,000.00	200,000.00	33,512.91
1917	1,000,000.00	1,000,000.00	2,343,276.59
1918	4,175,000.00	3,875,000.00	5,174,181.45
1919	6,000,000.00	6,000,000.00	7,162,999.24
1920	14,500,000.00	11,285,000.00	12,132,926.03
1921	30,680,674.52	30,680,674.52	31,171,470.67
1922	9,070,000.00	8,237,871.00	7,844,511.42
	65,925,674.52	61,278,545.52	65,862,878.31

"By referring to this statement, you will note that the total of the Appropriations - November 1st, 1916, to October 31st, 1922 - aggregates \$65,925,674.52, whereas the Advances to the Commission therefrom amounts to



\$61,278,645.52, and the sum expended upon the job is \$65,862,878.31, a difference of \$4,584,332.79 expended in excess of the Advances made by the Government in respect to this work. Practically all of this difference was obtained from unexpected Appropriations advanced to the Commission in respect to the Niagara System, Miscellaneous Construction work, and to some considerable extent from the Reserve Funds of the Commission.

"These Advances are made under the authority of Section (6) "B" - Power Commission Act, which reads as follows:-

'All special funds and the income and revenue thereof and all moneys and revenues which now are in or shall come into the hands of the Commission whether as agent, trustee, owner or otherwise shall form one fund to be called "General Fund" and the Commission shall have power from time to time to make any and all expenditures out of the said fund for the purposes and objects of the Commission without regard to the special trusts or purposes under which the same or any part thereof may come to its hands; and the Commission shall account for and from time to time pay out of the said funds all moneys for which it shall be so accountable.'

"Up to 1920 where the appropriation was less than the amount required to carry on the work the practice was to meet the excess expenditure under the authority of the above Section. This course had to be taken and the work continued by funds obtainable from the System to which it belonged, or the work had to be stopped. In 1920 the Act was further amended giving power to increase the Appropriation for the work by Special Warrant (See Section 24b Power Commission Act). Since this later amendment Special Warrants have been obtained from time to time to provide for cases where the expenditure exceeded the Appropriation and any discrepancies subsequent to that are due to transfers in the Commission's records, after the close of the Government's Financial Year, when all Appropriations lapse."



In amplification of the column entitled "Appropriations", Mr. Gaby has given me the following statement:

"Quezon-Chippawa Power Development

Provincial Appropriations for Years 1916 to 1922 inclusive

Year	Vote	Item	Page	Documents	Total
1916	221	9	25	Supplement to 1916 (Public Accounts 1915) .....	\$ 500,000.00
1917	254	1	53	Further Supplementary Estimates .....	1,000,000.00
1918	241	1	37	Further Supplementary Estimates .....	4,175,000.00
1919	246	10	34	Further Supplementary Estimates .....	6,000,000.00
1920	262	10	44	Further Supplementary Estimates .....\$10,500,000.00	
				Special Warrant- (Public Accounts Page 770-1920) .....	4,000,000.00
					14,500,000.00
1921	106	1	133	The Estimates .....	5,000,000.00
	201	1	50	Supplementary Estimates .....	21,700,000.00
				Special Warrant-(Public Accounts Page 927)....	3,980,674.52
					30,680,674.52
1922	113	1	100	The Estimates .....	875,798.00
	115	1		Supplementary Estimate..	613,000.00
	115	2		Supplementary Estimate..	2,867,000.00
	219	1	10	Further Supplementary Estimates .....	3,623,202.00
				Treasury Board Minute ..	1,070,000.00
					9,070,000.00
					\$65,925,674.52"

The requests for appropriations, year by year, are as follows in the file above referred to:



1913-1914.

There was a request for an appropriation in 1914, and the Government during its session in 1914 voted \$35,000 for the investigation of the possibilities of further development at Niagara beyond the hydro-electric plants then operating there.

1914-1915.

In "Estimated Expenditures, Fiscal Year 1914 to 1915" there is no reference to money required for the Queenston-Chippawa Power Development.

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1915-1916.

The "Estimate of Money Required for Fiscal Year 1915 - 1916" includes the item

Niagara Development - \$500,000.00.

This estimate was forwarded to The Honourable T. W. McGarry under date of March 28, 1916.

1916-1917.

In the Estimate of Money Required to Complete Work Orders under Construction, and for New Work During the Fiscal Year 1916 - 1917", dated February 16, 1917, there appears an item

Niagara Power Development - \$1,000,000.00.



Attached to the estimate is a memorandum dated February 21, 1917, explaining briefly the need for each item of the complete list. In regard to Niagara Power Development the memorandum reads "The amount specified covers the cost of initial construction of the canal, and purchase of necessary construction plant and materials".

In answer to an inquiry by the Prime Minister, Sir William Hearst, on December 12th, 1916, as to the total estimated cost of the work, the Secretary, Mr. Pope, replied as follows:

"The total estimate of the cost of the work for 100,000 H.P. installed is \$10,410,000. The total estimate for the cost of 200,000 H.P. installed is \$13,215,000.

Recent advances in the cost of hydro-electric machinery indicate that it will be necessary to increase these estimates 15% up to a possible extreme maximum of 20%. As against this, however, it may be mentioned that both of these estimates include an item of 25% for engineering and contingencies, which it is expected will absorb the greater portion of this advance in the cost of machinery, more especially in view of the economies which are sure to be effected by the Commission as a result of doing this work themselves."

#### 1917-1918.

In the "Estimates 1917 - 1918" under the head of "Niagara Power Development" appear the items

Balance due on Work and Equipment, Nov. 1, 1917 - \$1,175,000

Estimates for 1917 - 1918 ..... - 3,000,000

Estimated Expenditures 1917 - 1918 ..... - \$4,175,000

This memorandum was forwarded by Mr. Pope to The Honourable Mr. McGarry on February 5, 1918, with a letter.



Under date of January 31st, 1918, The Honourable Sir William Hearst wrote to the Commission inquiring about a number of points. Point 10 was as follows: "Power to be obtained by Chippawa-Queenston Development, capital outlay, and when power will be available." Mr. Pope replied to all the points in the letter under date of February 5, 1918, and to the above point he answered: "Present plans and specifications for power canal provide for 300,000 horse-power and station and power-house installations of capacity of 100,000 to 300,000 horse-power at an expenditure of from \$17,000,000 to \$24,000,000, expected to be available by the end of 1920."

1918-1919.

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In the "Estimate of monies required for the construction and extensions on the following systems, and for Provincial expenditures, during the fiscal year 1918-1919" the following item appears:

Queenston-Chippawa Development - \$6,000,000.

This estimate was dated February 22, 1919, and was accompanied by a letter of the same date from Mr. Gaby to The Honourable Mr. McGarry giving a brief memorandum of each of the items in the estimate. On the day following, i.e. February 23, 1919, Mr. Gaby wrote to The Honourable Mr. McGarry commencing his letter: "In answer to Mr. Matthew's request of yesterday, I am pleased to give you the following resume of the work of the Commission during the fiscal year 1916-17 and the work covered by the estimates for the year 1917-18:

Niagara Power Development.

The amount specified in the estimates covers the balance due on work and



equipment on November 1, 1917, and an estimate of \$3,000,000 for the year 1917-18 on the construction of Canal, bridges and other permanent work in connection with same." The balance of the letter refers to other items in the estimate.

Under the heading "Waconston-Chippawa Development" this statement was made: "The amount specified covers estimates on account of capital expenditure in connection with the development, canal, turbines and generators, for the year 1918-19."

On February 20, 1919, The Honourable T. W. McGarry wrote officially from the Parliament Buildings to the Secretary of the Commission, Major W. W. Pope, as follows:

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"Would you please furnish me, not later than Saturday of this week, with a detailed estimate of probable expenditures for the current fiscal year. I am endeavouring to prepare material for my budget, which will be delivered early in the session, and it is quite impossible for me to complete it until I have a statement from your Commission.

I would also like a statement showing how much money has been expended on the Chippawa Development up to the present time, and the estimated cost of its completion. I would also like a statement showing what horse-power will be developed at that cost.

You will quite appreciate the fact that I will probably be asked a number of questions when delivering the budget, and I wish to be in a position to reply to them."

The Honourable Mr. McGarry again wrote Secretary Pope as follows, on February 24th, 1919:

"On the 20th instant I wrote you a letter in which I asked for:

1. The estimated expenditures for the current fiscal year,



2. A statement showing how much money has been expended on the Chippawa Development up to the present,
3. The estimated cost of completion of this work,
4. A statement showing what horse-power will be developed at that cost,

In the information given me today, I see nothing except the estimated amount to be expended this year.

I would like you to give me the completed information with as little delay as possible."

This letter was answered the next day by Mr. Pope as follows:

"Toronto, February 25th, 1919.

"Honourable F. W. McGarry,  
Provincial Treasurer,  
Parliament Buildings,  
Toronto.

COPY

Dear Sir: re Chippawa.

Yours of the 24th instant to hand, I regret that the information furnished you by Mr. Gilmour, our Treasurer, did not contain all that you require.

I am now instructed to advise you, in reply to your letter of the above date, that the amount of money expended on the Chippawa development up to 31st January, 1919, was \$8,487,215.52, of which approximately \$3,000,000. was for construction plant, and machinery.

The cost of the completion of the work was estimated at \$24,000,000. to \$25,000,000. The horse-power to be developed at that cost is estimated at 300,000.

Trusting this will give you the information you require. If, however, there is anything further I shall be pleased to furnish it.

Yours truly,

(Signed) W. W. Pope,

Secretary."

1919-1920.

On March 2, 1920, the Secretary of the Hydro-Electric Power Commission



wrote to The Honourable Peter Smith, enclosing "the estimates of the Hydro-Electric Power Commission for the coming year". In this estimate the following item appears:

Queenston-Chippawa Development - \$10,500,000.

On May 18th, 1920, Mr. Gaby addressed a formal seven-page letter to Lt. Col. Hon. D. Carmichael, which reads as follows: "With further reference to the estimates of the Commission, I am handing you herewith a few additional details in connection with the proposed expenditure on the various systems", and in regard to Queenston-Chippawa Power Development the item "\$10,500,000." is repeated with the explanation: "This covers necessary expenditures on account of the completion of the canal and the purchasing of equipment, including turbines and generators."

On May 19th, 1920, another letter was addressed by Mr. Gaby to Lt. Col. Hon. D. Carmichael reading: "With further reference to memorandum of May 18th, in connection with the estimates of the Commission, I am giving you further explanations of these details". The item of \$10,500,000. is repeated and is followed by this paragraph:

"This covers expenditures in connection with the head-works, canal, generating station, and payments on turbines, generators, and other equipment ordered and to be ordered during the present year."

On October 14th, 1920, the Treasurer of the Hydro-Electric Power Commission wrote The Honourable Peter Smith as follows:



"October 14th, 1920.

"Honourable Peter Smith,  
Provincial Treasurer,  
Parliament Buildings,  
Toronto, Ontario.

Dear Sir:

I am instructed by the Commission to enclose you a revised estimate of monies required for the fiscal year ending on the 31st of October, 1920, in accordance with the 1920 amendment to the Power Commission Act, Section 4, sub-section 24-B, and am, also, enclosing you two (2) requisitions, one for One Million dollars, (\$1,000,000.) and the other for Nine Hundred and Sixty-two Thousand Five Hundred dollars, (\$962,500.) and should be very much obliged if you will kindly send the Commission cheques for above amounts on dates specified in the requisitions.

Thanking you,

COPY

Yours very truly,

(Signed) J. W. Gilmour,

Treasurer."

On October 22nd, 1920, the Chairman of the Hydro-Electric Power Commission wrote to The Honourable Mr. Drury as follows:

"October 22nd, 1920.

"Hon. E. C. Drury,  
Premier of Ontario,  
Parliament Buildings,  
Toronto, Ont.

Attention: Hon. Peter Smith, Provincial Secretary

Dear Sir:

The work of construction and the equipping of the Nipigon System, the Rideau System and the Queenston-Chippawa Development Works have necessitated an expenditure greater than that contained in the Commission's estimates. I need not advise you that it is



necessary that all of these works should be proceeded with and that the additional sums set out hereunder are required for that purpose and the Commission will, therefore, be obliged if you will have an Order-in-Council passed, in pursuance of Section 4 of The Power Commission Act, 10 & 11 Geo. V. Chap. 18.

Thunder Bay System	-	\$830,000.00
Rideau System	-	113,000.00
Queenston-Chippawa Dev't	-	<u>975,000.00</u>
Total.....		<u>\$1,918,000.00</u>

The full details respecting the original estimates and revised estimates for the year were forwarded to the Provincial Treasurer on October 14th, a copy of which is hereto attached.

Yours very truly,

(Signed) A. Beak,

Chairman."

COPY

I have not been able to find the details referred to as having been transmitted to the Provincial Treasurer on October 14th, but Mr. Geo. Grant, Secretary to the Prime Minister, acknowledged the receipt of the letter on October 26th, 1920. A special Warrant including \$4,000,000 for the Queenston-Chippawa Power Development was issued by the Government in October, 1920.

1920-1921.

On May 25th, 1920, Mr. Gaby wrote to The Honourable D. Carmichael "with reference to the estimates of the Commission for the first five months of the next fiscal year, or from November 1st, 1920, to March 31st, 1921, inclusive. I am handing you herewith a few details of the proposed expenditures on the various systems". The following item was included:

Queenston-Chippawa Development - \$5,000,000.



with this explanation: "This covers work on the construction of the intake at Chippawa, earth and rock excavation on the canal, the lining of the canal, construction of the headworks, power house foundation and building, construction of bridges and road diversions, supply of cement, steel, etc. and bridge material; payments on the electrical and turbine equipment, etc."

The "estimate of capital expenditure for five months - November 1, 1920, to March 1, 1921", reading as follows with reference to the Queenston-Chippawa Development:

Amount voted by Legislature to March 1, 1921, \$106 ...	\$ 5,000,000.
Revised estimate .....	<u>12,500,000.</u>
Amount for special warrant .....	\$ 7,500,000.

A document entitled "Estimated Capital Expenditure from November 1, 1920, to March 31, 1921" bearing a pen and ink notation - "Revised estimate submitted to Government, January 21, 1921" - has the following item:

Queenston-Chippawa Development - \$12,500,000.

This covers expenditure in connection with the continuation of the work on the canal and head works; also generating station, penstocks, turbines, generators and accessory equipment for five units.

On January 21st, 1921, the Acting Chairman of the Hydro-Electric Power Commission, Mr. I. B. Lucas, addressed a formal letter to The Honourable Mr. Drury reading as follows, in regard to the Queenston-Chippawa Development:

The first of these is the fact that the system is not yet fully operational. The second is the fact that the system is not yet fully operational. The third is the fact that the system is not yet fully operational. The fourth is the fact that the system is not yet fully operational. The fifth is the fact that the system is not yet fully operational. The sixth is the fact that the system is not yet fully operational. The seventh is the fact that the system is not yet fully operational. The eighth is the fact that the system is not yet fully operational. The ninth is the fact that the system is not yet fully operational. The tenth is the fact that the system is not yet fully operational.

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"January 21st, 1921.

"The Honourable H. G. Drury,  
Premier of Ontario,  
Parliament Buildings,  
Toronto, Ontario.

Dear Sir:

The Commission herewith submit the attached statement covering revised estimates of moneys required to carry on the work under way by the Commission for the period from November 1st, 1920, to March 31st, 1921, less the amount already voted, \$106, by the Legislature for the period of November 1st, 1920, to March 31st, 1921.

The reason for the increased amount for Chippawa Development is the urgency for the completion of this work at the earliest possible date and the increased equipment and force required to complete the work in the early Fall of 1921.

The moneys expended in connection with the Chippawa Development will be substantially lessened after July, 1921, as the work will then be approaching completion, as it is expected that operation will commence some time in September, 1921.

In the cases where the appropriation is exhausted, as shown by the attached statement, I beg to report that it is necessary and expedient that the work for which such appropriations were made, should be proceeded with and that the additional sums as shown in the attached statement, are required for the purpose of carrying on the work and I am today authorized by the Commission, as Acting Chairman, to so report to the Lieutenant-Governor-in-Council.

This appropriation and report is made in pursuance of Section (4) of the Act to Amend the Power Commission Act, 1920.

In connection with the estimated amounts under the various headings for the Period of November 1st, 1920, to March 31st, 1921, under Vote #106, Items 1 to 13, the Commission will require additional amounts, as follows:

<u>Vote</u>	<u>Item</u>	<u>System</u>	<u>Amount</u>
#106	1. Queenston-Chippawa Dev't		\$7,500,000

I beg to call your attention to the necessity of passing the Treasury Board Order before the House meets. The Commission will, therefore, be glad if the matter can receive early consideration, and, if approved, the necessary Order-in-Council may be passed.

Yours truly,  
(signed) I. B. Lucas,  
Acting Chairman."



Mr. Homer Wallis addressed the following memorandum to Colonel Carmichael on January 21st, 1921:

"Toronto, January 21st, 1921.

"Memorandum for Colonel Carmichael:

re Hydro-Electric Power Commission Estimates.

After consultation with the Assistant Treasurer and the Auditor, it appears that, to meet the financial requirements of the Commission, Vote 106 should be increased by Treasury Board warrant by a sum required to be paid over to the Commission by the 31st of March. This sum may properly include enough to carry on during April in case the Estimates are not passed by the House by that time, but the warrants must be issued before March 31st, although the cheques may go out subsequently as found convenient by the Treasury.

(Signed) Homer Wallis."

COPY  
This memorandum bears the following pen and ink notation:

"Further estimates and letter attached which were given to Col. Carmichael at four o'clock January 21st to deliver to the Cabinet.  
(Signed) W.W.P."

On January 27th, 1921, Mr. I. B. Lucas, Acting Chairman, wrote to The Honourable Mr. Drury, submitting the supplementary estimates from April 1st, to October 31st, 1921, covering "monies required to carry on the works already in hand, and such new work as may be authorized during the year."

In this document entitled "Estimated Capital Expenditures to October 31st, 1921" appears this item:

Queenston-Chippawa Development - \$14,200,000.

The details accompanying this item are given as follows:

"Hydraulic Construction ..... \$12,500,000.

Covering cost of excavation on the Canal and Chippawa River, including Head Works, Gate House, Penstocks, and Power House, together with necessary equipment for installation of three turbines and accessories. Also includes



purchase of such additional constructing plant as may be necessary to complete the work, and material such as cement, lumber, stores, etc.

Electrical Generation ..... \$ 1,700,000.

This covers progress on work authorized for the purchase and installation of five electrical generating units, together with the necessary switching for 12,000 V. buses, reactors, oil circuit breakers and building superstructure."

A copy of the same documents was transmitted officially by Mr. Gaby to Colonel Carmichael on the same day with a letter of transmittal.

On February 12, 1921, Mr. Wallis wrote to J. W. Gilmore, Esq., Hydro-Electric Power Commission, as follows:

"Toronto, February 12th, 1921.

"Dear Sir: re Estimates, Hydro-Electric Power Commission.

I telephoned you this morning about this matter and have since conferred with the Treasury and the Audit office. The estimates of the Commission, as passed last Session down to March 31st, provided for the sum of \$7,590,000. To this was added by Special Warrant the sum of \$8,725,000. Your estimate for the balance of the fiscal year provides for the expenditure of \$20,592,700. As it is necessary to vote the amounts provided by Special Warrant in the House, the sum of \$8,725,000, thus provided will be incorporated with the sum of \$20,592,700, already mentioned, making altogether \$29,317,000. to be voted in the supplementary estimate.

As I explained to you, it is very necessary that there should be a detailed statement covering each item showing the progress made with the work, the amount expended and the probable expenditure, also the object of the development and what is intended to be accomplished. In short, sufficient information should be given to enable the Government to answer any likely questions and to enable the House to fully understand the reasons and the advantages of the possible cost of each undertaking, just as the Engineer himself and the Commission will understand the matter.

I have already discussed this phase of the matter with Mr. Gaby and Mr. Pope and have pointed out the necessity for providing this information and the Premier hopes it will be



available in good shape before the matter comes before the House.

Yours very truly,

(Signed) Homer Wallis,  
Deputy Minister."

J. W. Gilmour, Esq.,  
Hydro-Electric Power Commission,  
University Avenue,  
Toronto, Ontario.

P.S. I should add that the explanation of the various items should cover the expenditure for the whole year, including the amount already voted in the Main Estimates last Session, so that the House may be seized of the facts in each case.

On October 13th, 1921, the Chairman of the Hydro-Electric Power Commission wrote to The Honourable Mr. Drury as follows:

COPY

"October 13th, 1921.

"The Hon. E. G. Drury,  
Prime Minister of the Province of Ontario,  
Parliament Buildings,  
Toronto, Ont.

Dear Sir:

I am instructed by the Commission to forward to you a copy of the revised estimates of the Commission for moneys required for the fiscal year ending October 31st, 1921.

I am enclosing the following statement, viz:-

1. A statement headed "Additional Monetary Requirements for 1920-21" showing the amounts voted under Vote 201, and Vote 106, and a revised estimate for 1921 of \$39,876,357.61, increasing the total amount voted by an amount of \$2,938,657.61.

This revised estimate includes the interest during construction, being an amount equal to \$2,650,450.78.

2. A statement headed "Additional Monetary Requirements" giving the amount of the revised estimate and the amount received to October 13th, 1921, of \$32,500,000.00, and the balance due under the revised estimate of \$7,376,357.61, disposed of in the manner shown, which amount includes interest and sinking fund to an approximate amount of \$5,150,396.16 which will be returned to the Government as due, leaving a balance of approximately \$2,000,000.00.

3. A statement headed "Monetary Requirements" showing the revised estimates and moneys received for each system to October 13th, 1921.



The Commission recommends that it is necessary and expedient that these works shall be proceeded with as covered by above statements, and respectfully request that an additional sum so required for that purpose shall be appropriated and that the Lieutenant Governor-in-Council may order a special warrant to be prepared to be signed by the Lieutenant Governor for the issue of the amount estimated to be required in such fiscal year in pursuance of the Power Commission Act 10-11 Geo. V. C. 10, S. 4.

Yours truly,

(Signed) A. Beck,  
Chairman."

The Secretary of the Hydro-Electric Power Commission enclosed a copy of the above correspondence to The Honourable Peter Smith on October 14th, 1921.

COPY

On October 26th, 1921, the Chairman of the Hydro-Electric Power Commission wrote The Honourable Mr. Drury as follows, and a copy was sent to the Provincial Treasurer:

"October 26, 1921.

"The Honourable E. C. Drury,  
Prime Minister, Province of Ontario,  
Parliament Buildings,  
Toronto.

Dear Sir:

re Estimated Capital Expenditures

In connection with the Commission's Estimated Capital Expenditures for fiscal year 1920-1921 appropriated under Votes 106 - 201, if you will kindly observe the Revised Estimated Expenditures which accompanied my letter of October 13th, it will be noted there is a total reduction in the original estimate amounting to \$1,916,647.27 made up of the following:

Items 2 - Niagara System .....	\$965,647.27
3 - Severn " .....	55,000.00
4 - Eganville " .....	75,000.00



Vote 201 5 - Wasdell System .....	\$ 50,000.00
" 106 5 - Muskoka " .....	5,000.00
6 - St. Lawrence System .....	195,000.00
9 - Central Ontario System .....	568,000.00
11 - Essex County System .....	3,000.00

Total ..... \$1,916,647.27

It will also be noted that the Commission will require additional amounts as follows:

Items 1 - Queenston-Chippawa Development	\$3,980,674.52
7 - Rideau System .....	12,416.07
8 & 12 - Port Arthur, Thunder Bay and Superior System .....	266,795.27
10 - Nipissing System .....	27,000.00
13 - Miscellaneous .....	209,350.16
14 - Expenditures on account of Province .....	<u>359,066.86</u>

Total ..... \$4,855,304.88

The Commission recommends that it is necessary and expedient that these works shall be proceeded with, and I respectfully request that the additional sum so required for that purpose be appropriated and an Order-in-Council for a special Warrant or Treasury Board Order be prepared and signed by the Lieutenant-Governor for the issue of the amount estimated to be required in such fiscal year in pursuance of the Power Commission Act 10 - 11 George V. c 18 Sec. 4.

A statement showing appropriation under Votes 106 - 201 together with Revised Estimated Expenditures, is attached hereto.

Yours very truly,  
(Signed) A. Beck,  
Chairman."

The reference in the letter is to an item which appears under the head of "Hydro-Electric Power Commission of Ontario Estimated Capital Expenditures 1920 - 1921"

Queenston-Chippawa Development:

Appropriation .....	\$26,700,000.00
Revised Estimate ..	30,680,674.52 ✓
Over-expended .....	3,980,674.52



On February 2nd, 1922, the Secretary of the Hydro-Electric Power Commission wrote The Honourable E. C. Drury as follows:

"February 2, 1922.

"Honourable E. C. Drury,  
Prime Minister, Parliament Buildings,  
Toronto, Ontario.

Dear Sir:

I am directed by the Commission to forward to you the attached statements reflecting details of the expenditures on Capital account during the period November 1920 to October 31, 1921, in compliance with your request.

Yours very truly,  
(Signed) W. W. Pope,  
Secretary."

COPY

In the "Statement Showing Revised Estimates for Year 1920 - 1921 and Expenditures to October 26, 1921, Including Interest and Overhead Construction Expense" the following figures appear under the head of Queenston-Chippawa Development:

"Revised Estimate 1920 - 1921 .....	\$30,680,674.52	①	②
Expenditure to October 26, plus			
Estimated Interest and Over-			
head Construction Charges for			
the Year .....	30,385,829.26		
Advanced by the Province .....	26,700,000.00		
Amount Included for Interest			
in the second item above .....	2,461,032.15 "		

In the table entitled "Additional Monetary Requirements 1920 - 1921" the following item appears with reference to Queenston-Chippawa Development:

"Vote 201 .....	\$21,700,000.00
Original Estimate - Vote 106 .....	<u>5,000,000.00</u>
Total .....	\$26,700,000.00



Revised Estimate, 1920 - 1921 ..... \$51,380,674.52  
 Increase over original estimate ..... 4,680,674.52 "

1921 - 1922.

On March 24, 1921, the Secretary of the Hydro-Electric Power Commission wrote to The Honourable E. C. Drury enclosing the estimates of the Commission's capital expenditures for the fiscal year 1922.

The item in the expenditures for the Queenston-Chippawa Power Development is \$676,798.00. The reference to the amount in detail is as follows:

"Electrical Generation ..... \$376,798.00

For completion of payments on contracts for five main generators, two service units, generation's share of switching equipment, reactors, cranes, proportion of station to be built this year.

Hydraulic Construction ..... \$500,000.00

For completion of payments covering cost of excavation on the Canal and Chippawa River, including intake at Chippawa, the Welland River, Canal, Forebay, Screen House, Penstocks, Power House, Hydraulic Machinery, Right-of-Way, Miscellaneous, Highway and Railway Bridges, together with the necessary equipment for the installation of five turbines of 55,000 horse-power capacity and accessories, in which is included necessary pumps, governors, piping, signal equipment, etc. Also such construction plant as may be necessary to complete the work, materials, labour, cement, stores, etc."

On February 2, 1922, the Chairman of the Hydro-Electric Power Commission wrote to The Honourable E. C. Drury as follows:

"February 2, 1922.

"The Honourable E. C. Drury,  
 Prime Minister, Parliament Buildings,  
 Toronto, Ontario.

Sir:

I beg to advise you that the Government appropriation in



respect to Queenston-Chippawa Development amounting to \$876,798.00 (Vote 113 - Item 1 - 1920-1922 Estimates) has become exhausted and, as it is necessary and expedient that this work be proceeded with, request that the sum of three million five hundred thousand dollars (\$3,500,000.) be provided for by Special Warrant to take care of immediate commitments in respect of this work.

This request is made in compliance with requirements of the Power Commission Act, Section 24b.

Yours very truly,

(Signed) A. Beck,  
Chairman."

The following day, February 3, 1922, the Secretary of the Hydro-Electric Power Commission wrote as follows to The Honourable E. C. Drury:

"February 3rd, 1922.

"Honourable E. C. Drury,  
Premier of Ontario,  
Parliament Buildings,  
Toronto, Ontario.

Dear Sir:

The Commission have been requested by Colonel Honourable D. Carmichael to give an estimate of what monies out of those already voted in the 1922 estimates would be required for the Commission's purposes between February and May first next, and I am instructed to say that the Commission estimate the amount so required at \$2,000,000.00, apart from the additional amount being requisitioned for the Queenston-Chippawa Development.

Yours very truly,

(Signed) W. W. Pope,  
Secretary."

Attached to these papers is a memorandum entitled "Memo re 1922 Estimates" dated January 12, 1922, stating that in addition to the Vote of the Legislature for \$6,943,199.00 of appropriations for the year 1921-1922, the Commission would require certain other amounts to be obtained by Special

8903

Warrant or otherwise. In connection with the Queenston-Chippawa Power Development the amount is given at \$7,123,202.00. The explanation and reason for the request is given as follows in connection with the Queenston-Chippawa Power Development:

"The estimates have been exceeded as set forth in the memorandum of the Consulting Engineers, Messrs. Kerbaugh & Stuart, and the \$5,000,000.00 is asked as an appropriation for the completion of the intake, the dredging of the Welland River, completion of bridges, balance of outstanding contracts for turbines, and for the completion of power house, screen house and penstocks for five units, and \$2,123,202.00 for the superstructure of the power house, electrical and generating equipment and switching.

The estimated expenditure on account of this part of the work was \$4,500,000 to the end of 1921, of which only \$2,040,000 has been expended, leaving a balance of \$2,840,000 against which the above appropriation is asked at this time."

A second memorandum in reference to the same subject, dated February 1, 1922, and marked "Approved at Meeting February 10, 1922" is evidently a revision of the first. The same amount, \$7,123,202.00 is given for the Queenston-Chippawa Power Development, with the following explanation:

"(a) The estimates have been exceeded as set forth in the memorandum of the Consulting Engineers, Messrs. Kerbaugh & Stuart, and the \$5,500,000 is asked as an appropriation for the year 1922 on the completion of the intake, the dredging of the Welland River, completion of bridges, balance on outstanding contracts for turbines, the completion of the power house, sub-structure and penstocks for five units; no interest during construction has been allowed on these items.

(b) \$2,500,000 for the superstructure of the power house and screen house, and electrical and generating equipment. The estimated expenditure on account of this part of the work was \$4,885,275, of which only \$2,040,000 has been expended, leaving a balance of \$2,845,275, against which the above appropriation is asked at this time."

This latter memorandum is signed by Mr. Gaby. The former memorandum is unsigned.

On February 10, 1922, the Chairman of the Hydro-Electric Power Commission



wrote the following letter to The Honourable E. C. Drury:

"February 10th, 1922.

"The Honourable E. C. Drury,  
Prime Minister of Ontario,  
Parliament Buildings,  
Toronto, Ontario.

Dear Mr. Drury:

Replying to your letter of 8th instant, with reference to the Queenston-Chippawa Development, I would say:

(1) The expenditure upon this work up to January 31st, 1922, together with accrued interest, amounts not to \$63,000,000.00 as mentioned in your letter, but to \$61,093,215.28.

I am enclosing a statement showing in detail the expenditure to January 31st, 1922, and the accrued interest for November and December, 1921, and January, 1922.

A statement to January 31st, 1922, of expenditures on Niagara System Transformation Equipment (Queenston), amounting to \$1,920,229.13, is also enclosed herewith.

(2) The sum of approximately \$5,000,000.00 added to the Stuart and Kerbaugh estimate covers items other than contingencies, namely, an amount of \$2,500,000.00 for interest during construction in the year 1920-1921, and interest for 1919-1920, to the extent of \$768,000.00.

(3) The amount of \$7,123,202.00 mentioned in the memorandum of the first instant referred to by you, is for the current fiscal period of November 1st, 1921, to October 31st, 1922, and includes expenditure chargeable since the last fiscal period. The whole of this amount is not, therefore, as you anticipate, to be added to the total expenditure up to the present date, but to the total expenditure up to October 31st, 1921.

In addition to the above amount, the Vote of the Legislature No. 113 provides for an appropriation of \$876,796.00, making a total estimated expenditure for the fiscal year 1921-1922 of \$8,000,000.00 on the Queenston-Chippawa Development.

(4) The following is a summary:

Expenditure to October 31st, 1921,  
including \$4,591,132.46 of interest ..... \$57,562,742.03



Estimated expenditure to May, 1923, to complete the five units by January, 1923, including \$8,000,000.00 estimat- ed for the current fiscal year, as above stated .....	\$ 9,302,861.00
Total to complete, with interest to October 31st, 1921 .....	\$66,865,603.03
Further estimated amount of Interest to complete, chargeable to Capital Cost .....	2,000,000.00
Total Capital Investment to complete, including interest .....	\$68,865,603.03
Less estimated salvage value of Con- struction Plant, Buildings and Stores costing \$18,977,600.58, to be recover- ed during the period now in question ....	3,500,000.00
<b>COPY</b> Total .....	\$65,365,603.03

In October last the gross estimates discussed with you for the completion of five units were \$66,535,810.00 as compared with \$66,865,603.00 above shown, while the probable net amount was estimated in October last at about \$65,000,000.00 as compared with \$65,365,603.00 above shown. The estimate discussed in October did not include interest for the year 1922. The interest to complete and the salvage estimated to be recovered during the construction period extended to the same date will be approximately the same.

It is anticipated that the return from the salvage on the construction plant, buildings and stores to be ultimately recovered will exceed by a considerable amount the salvage estimated to be recovered during the construction period.

(5) Every care was taken to have the best possible estimates obtained, and the employment of Messrs. Stuart and Kerbaugh, and Messrs. Lea and Johnson, for that purpose, was approved by the Government, and, as explained in the material already forwarded to you, the increased cost over the estimates of 1921 were due to causes justifiably unforeseen.

(6) I might here say that all conditions known to me or to the Commission's engineers were fully disclosed to the Government.



(7) The form of the requisition submitted was the same as has been previously submitted and acted upon, but in accordance with your request an estimate is herewith submitted in detail, which estimate was approved by a full meeting of the Commission today.

I am,

Yours truly,  
(Signed) A. Beck,  
Chairman."

On March 9, 1922, Mr. Gaby sent a memorandum to Mr. Pope transmitting supplementary estimates for 1922, which for the Queenston-Chippawa Development again include the sum of \$7,123,202.00, \$2,123,202.00 of which was for "electrical generation" and \$5,000,000.00 for "hydraulic" work. This document Mr. Pope sent to The Honourable Mr. Drury with a letter of transmittal on March 10, 1922.

On October 24, 1922, the Chairman of the Hydro-Electric Power Commission wrote to The Honourable Mr. Drury as follows:

"I beg to inform you that after a careful analysis of the Commission's Expenditures on Capital Account as applied to the several votes and Sub-divisions thereof for the fiscal year ending October 31, 1922, it is stated that appropriations pertaining to certain Sub-items have become exhausted, and as it is necessary and expedient that the work relating shall be proceeded with, I respectfully request that the additional monies required, as listed in the following tabulation, be appropriated as provided for under the Power Commission Act, Sec. 24b, 10-11, Geo. V. c.18, s. 4.

<u>Vote</u>	<u>Item</u>	<u>Sub-item</u>	
219	2	3	Niagara System
			2-110 K.V.Circuits
			Queenston-Niagara Falls \$12,500.00
113	7	2	St. Lawrence System
			Miscellaneous Betterments 3,500.00



<u>Vote</u>	<u>Item</u>	<u>Sub-item</u>		
113	9	2	Thunder Bay System Nipigon Electrical	\$ 9,200.00
113	10	4	Central Ontario System Local Systems	77,000.00
113) 115) 219)	1	2	Queenston-Chippawa Hydraulic Construction	

It is estimated that the amount of Interest to be capitalized on the Queenston-Chippawa Development, not included in the 1922 Estimates will approximate \$2,000,000.00 of which sum the Commission will have received through the above appropriations approximately \$930,000.00 on this account, leaving a balance of \$1,070,000.00 -

1,070,000.00

COPY

\$1,172,200.00

Adding the above to the appropriations provided by Votes 113-115 and 219 amounting to \$17,309,968.00 the total appropriations for the year will be \$18,482,168.00 against which the Commission will draw up to a total of approximately \$14,400,000.00.

Yours very truly,

(Signed) Adam Beck,  
Chairman."

This completes the references in correspondence to requests of the Hydro-Electric Power Commission for appropriations of money to be made by the Provincial Government.

*Walter J. Francis*

Consulting Engineer.

Toronto, February 13th, 1923.



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1919 proposed 450 to 500,000 H.P. installation  
estimated in 1922 (to Leroy) to complete 5 units cost \$65,365,603.

This would give:

1. 500 - 600,000 H installed canal capacity,

2. 275 - 300,000 H installed "

\$1,704,815. interest " not chargeable to operation"

General Fund - could be used for all purposes by H.

Special Warrant - provided in 1920 where expenditures exceeded appropriations

## Scope of Inquiry (how I see it)

1. Actual financial, plant and service conditions of H. at present
2. Causes contributory to those conditions
3. Remedies required to ensure continuation and increase of confidence in H, and, to place H on such a financial basis in the future as will enable them to render continuous and efficient service at a minimum price.



